REMARKS

Claims 1-3, 7 and 8 are pending in the present application and are rejected. Claim 2 is herein amended. No new matter has been entered.

Applicants' Response to Claim Rejections under 35 U.S.C. §103

Claims 1-3, 7 and 8 were rejected under 35 U.S.C. §103(a) as being unpatentable over Michel et al. (U.S. Patent No. 3,567,611) in view of Shipwash (U.S. Patent Application Publication No. 2002/0058273), Liu et al. (U.S. Patent Application Publication No. 2002/0155032), Geli (U.S. Patent Application Publication No. 2003/0027354) and Straume et al. (U.S. Patent Application Publication No. 2006/0127942).

It appears to be the position of the Office Action that Michel discloses the embodiments of claims 1-3, with the exception of teaching (i) multiple solutions, (ii) a pillar array, (iii) "injecting the target biopolymer into a solution. The Office Action appears to rely on Liu to teach (i) and (iii) and Geli to teach (ii). It is unclear why the Office Action cites to Shipwash. As to claims 7 and 8, it appears to be the position of the Office Action that the combination of Michel, Shipwash, Liu and Geli teaches the embodiment as claimed, with the exception of teaching using magnetic beads. The Office Action relies on Straume to provide this teaching. Applicants note that despite repeated requests to address each independent claim separately, the Office Action again groups the claims together. In order to expedite examination, Applicants again respectfully request that any future Office Action address independent claims 1, 2 and 7 separately.

Michel is directed at two-stage electrophoresis. In the first stage, samples in a gel are electrophoresed such that molecules travel in a vertical direction. The result of this is illustrated in Figure 7. After this is completed, the gel is placed in the magnetic field illustrated in Figure 4. This causes molecules to move in a direction parallel to the direction of the magnetic field. The result of this is illustrated in Figure 6.

Shipwash is directed at a method and system for rapid biomolecular recognition of amino acids and protein sequencing. Shipwash is primarily directed at proteomics, and is not related to nucleic acid and amino acid separation techniques. Shipwash generally discusses such techniques in paragraph [0306], as cited by the Office Action. In paragraph [0306], Shipwash discloses that its arrays "allow for the amino acid analysis of all proteins separated by a 2D electrophoresis gel on a single chip or plate simultaneously," and that this "provides a powerful method to identify proteins separated by 2D gels." In other words, Shipwash is directed to techniques used on proteins after they have been separated by electrophoresis. Thus, Shipwash is generally irrelevant to the claimed subject matter, and it is unclear why the Office Action cited this reference.

Liu is directed at a method and apparatus for reproducible sample injection on microfabricated devices. The microfabricated device uses capillary electrophoresis rather than slab gel electrophoresis, and is illustrated, for example, in Figures 2a-2c. The device includes three parts: a sample reservoir body 13, an injection bar 12 and a separation channel body 11. First, a sample is loaded into a sample reservoir 1 in the sample reservoir body. A voltage is then applied between sample reservoir 1 and waste reservoir 2. The analyte will migrate from the

sample reservoir 1, into the channel 17, then into a sample injector 15 of the injection bar 12. It appears that some of the analyte will also migrate from the sample injector 15 into channel 16 to waste reservoir 2. See Figure 2b. Then, the position of the injection bar 12 is shifted horizontally, until sample injector 15 aligns with separation channel 6. See Figures 2c. Then, a voltage is applied between cathode reservoir 3 and anode reservoir 4. The analyte will then migrate into separation channel 6 for analysis. See paragraphs [0053] and [0054]. It appears that separation channel 6 contains some type of separation column or gel. Liu does not comment on what happens to the analytes after they leave the separation channel.

Geli is directed at a device for the analysis of chemical or biochemical specimens, comparative analysis and an associated analysis process. The device of Geli is illustrated in Figure 1, and explained in paragraph [0059]. The device includes a single feeder channel 4, a plurality of fractionation micro-columns 2, and a single evacuation channel 6. Each fractionation micro-column 2 includes an intermediate micro-channel 5, and a micro-channel 3. The micro-channels 3 each include a separation means, while the intermediate micro-channels 5 do not include a separation means. The separation means of the micro-channels "can be filled with polymeric monoliths that are appropriate for protein separation." See paragraph [0191]. The Office Action interprets these polymeric monoliths to be pillar arrays.

Straume is directed at particle analysis assay for biomolecular quantification. The assay is conceptually illustrated in Figure 9. The target DNA contains two non-overlapping sequences, called "Type 1 DNA" and Type 2 DNA." A magnetically responsive bead is attached to a first probe DNA, which is complementary to the Type 1 DNA. Additionally, a non-magnetically

responsive, electrochemiluminescent (ECL) bead is attached to a second probe DNA, which is complementary to Type 2 DNA. The first probe DNA is allowed to hybridize with the target DNA. After this, the magnetic force is applied and the target DNA is immobilized by the magnetic force. Thus, the target DNA is sorted from other DNA which does not have a sequence complimentary to the first probe DNA. Then, the second probe DNA is allowed to hybridize with the target DNA. The presence or absence of the ECL can then be visually confirmed. Thus, the target DNA is distinguished from other DNA which have the sequence complimentary to the first probe DNA, but do not have the sequence complimentary to the second probe DNA. See paragraphs [0022] and [0023]. Additionally, the non-magnetically bead may be electrically charged. In this case, after magnetic separation, the remaining beads can be subjected to electrophoresis prior to detection. See paragraphs [0023] and paragraphs [0123]-[0126].

First, Applicants address claim 1. As to claim 1, the Office Action essentially alleges that it would have been obvious to modify Michel by "injecting" the target biopolymer into a solution. Michel states that the samples are deposited "at one side on a top surface of the rectangular prism of gel 12 in a slight depression of 0.1 to 0.2 ml." Column 2, lines 36-37. In Michel, the sample is moved into the gel, and is moved in two different directions within this gel. However, Michel does not disclose or suggest "moving said target biopolymer...into said second solution in the section area using electrophoresis." Michel also does not disclose or suggest "preserving said target biopolymer in said second solution in said second area."

Liu and Geli also do not disclose this subject matter. In Liu, the samples are disclosed to enter separation channel 6, but there is no disclosure of the samples exiting the separation

channel 6 or being preserved in the anode reservoir 4. Meanwhile, Geli teaches that "[t]he molecules which migrate through the terminal element 9 are evacuated through the evacuation outlet 3b and the evacuation channel 6." Geli does not teach that the samples are preserved after they enter the evacuation channel 6.

Applicants respectfully submit that it would not have been obvious to modify Michel by allowing the samples to exit the gel and enter the solution surrounding the gel. In order to obtain the samples which have been separated by using electrophoresis in the gel, it is conventional to collect the samples by cutting out a portion of the gel wherein the samples remain after a predetermined time and to extracting the samples from the cut out portion. On the other hand, the claimed embodiment requires collecting the sample by preserving it after it enters the solution. None of the cited art discloses or suggests this. As noted in MPEP §2100(X)(D)(3), "proceeding contrary to accepted wisdom in the art is evidence of nonobviousness." *In re Hedges,* 783 F.2d 1038, 228 USPQ 685 (Fed. Cir. 1986)

Additionally, Applicants respectfully submit that modifying Michel as proposed would render Michel unsuitable for its intended purpose. Michel is aimed at characterizing samples by separating them by size and charge, and observing the results. However, the claimed embodiment is directed at physically sorting samples by separating them by size and charge and collecting the samples. If Michel were modified as proposed, it would be impossible to observe the results as illustrated in Figures 6 and 7, since in the process of such collection, the samples would run off the gel, making observation impossible. Thus, Applicants respectfully submit that

it would not have been obvious to modify Michel in order to arrive at the embodiment of claim 1. Favorable reconsideration is respectfully requested.

Next, Applicants address claim 2. Applicants first respectfully submit that it would not have been obvious to modify Michel to arrive at the embodiment of claim 2 for similar reasons as discussed above with respect to claim 1. Additionally, Applicants respectfully submit that the combination of cited art does disclose or suggest the embodiment as recited by claim 2. Claim 2 requires the use of a first electrophoresis device and a second electrophoresis device. None of the cited art discloses or suggests using a first and second electrophoresis device as claimed. Additionally, Applicants herein amend claim 2 to specify that the first and second electrophoresis devices generate electric fields which are perpendicular to each other. This subject matter is supported at least by Figure 2. Favorable reconsideration is respectfully requested.

Finally, Applicants address claim 7. Applicants first respectfully submit that it would not have been obvious to modify Michel to arrive at the embodiment of claim 7 for similar reasons as discussed above with respect to claim 1. Additionally, claim 7 requires that the magnetophoresis is performed after the electrophoresis. The step of "moving said target biopolymer fixed to said magnetic bead and said other biopolymers from within the first solution in said first area into said partition using electrophoresis" must occur prior to the step of "moving said target biopolymer fixed to said magnetic bead into said third solution in said third area using magnetophoresis," since this step is performed "while said target biopolymer fixed to said magnetic bead and said other biopolymers are in said partition." However, in Straume, the magnetophoresis always occurs before the electrophoresis. See paragraphs [0023] and [0024]. Thus, Applicants

respectfully submit that the combination of references does not disclose or suggest the embodiments as claimed. Favorable reconsideration is respectfully requested.

For at least the foregoing reasons, the claimed invention distinguishes over the cited art and defines patentable subject matter. Favorable reconsideration is earnestly solicited.

Should the Examiner deem that any further action by applicants would be desirable to place the application in condition for allowance, the Examiner is encouraged to telephone applicants' undersigned attorney.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP

Ryan B. Chirnomas
Attorney for Applicants
Registration No. 56,527
Telephone: (202) 822-1100
Facsimile: (202) 822-1111

RBC/nrp